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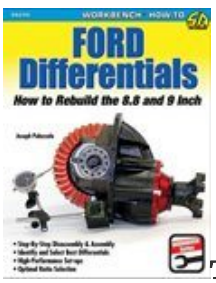
Ford FE Engine Exhaust Systems: Complete Guide

The exhaust system for the average high-performance and street driven Ford FE engine consists of a set of tubular headers, running through a couple of mufflers, and perhaps tailpipes out to the rear of the vehicle—pretty common stuff. But there are plenty of available options within that simple description, and a few things to look out for. Some parts that should fit—don't. And some of the original cast-header-style manifolds are actually quite good.

The factory 427 1963 cast headers produce surprisingly good power. The passenger-side pipes can be seen here.



This Tech Tip is From the Full Book, HOW TO BUILD MAX-PERFORMANCE FORD FE ENGINES. For a comprehensive guide on this entire subject you can visit this link:

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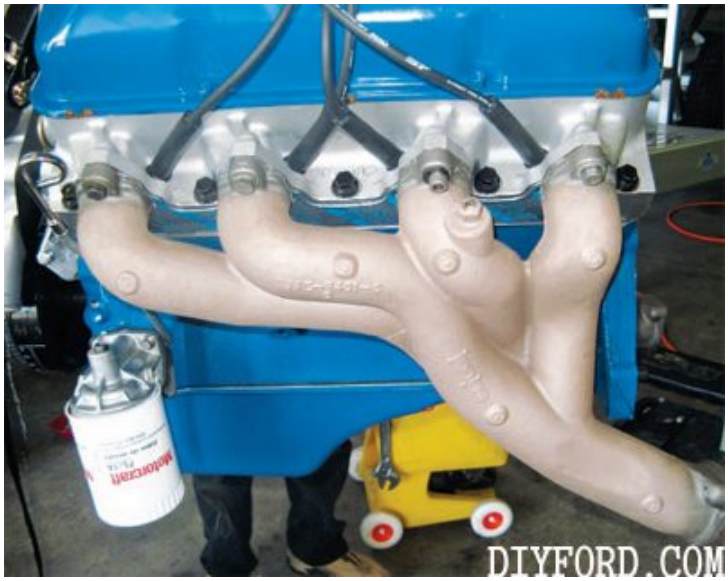


The 1963 driver-side factory 427 cast header is different than on the passenger side. Interestingly, there are slightly different ones available for 1965 cars as well, with revisions needed to clear the newer chassis design.

Headers and Manifolds

The first modification everybody makes, when seeking more power, is adding a set of headers. And this is as true today as it was back when these cars were new. The factory cast-iron manifolds found on most FE-equipped vehicles can best be described as terrible, so headers make a very noticeable improvement.

What Fits—and Doesn't Fit

FE wedge cylinder heads all have one of three bolt patterns on the exhaust side. The vast majority of heads have an "up and down" pair of 3/8-16 holes centered vertically on each port—eight holes per head.

The Cobra Jet heads add an extra pair of "side-by-side" holes at each port opening for a total of 16. The vertical holes remain the same as more common castings.

The 390 GT heads have a unique 14-bolt pattern, with upper holes all across, lower holes only on the front and rear ports, and the side-by-side holes as found on the CJ heads. The upper holes on the 390 GT heads are not in the same position as on other FE heads either—making proper header fit a challenge.

All aftermarket heads have the traditional vertical bolt pattern, and many also include the Cobra Jet pattern, either as a standard feature or in optional head castings.

It is hard to believe that headers with as many as 16 fasteners could ever leak, but they sometimes do. And there is a reason.

Here is a 1967 427 2×4 Fairlane engine. Note the unique exhaust manifolds, which were not used on any other application.

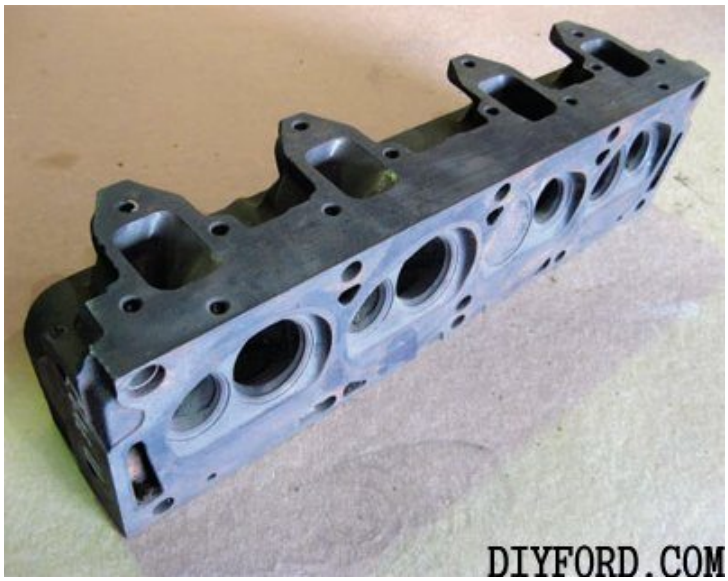
Despite the fact that the vertical bolt pattern is the same on most heads, the location of the exhaust port relative to those vertical bolt holes changes from one head casting to another. Any FE header physically bolts to any cylinder head (with the possible exception of the 390 GT). But the exhaust port on some combinations are very close to or even overlap the header tube

opening, causing a leak at the mounting flange. This is something that needs to be checked before installing your headers. The “fix” is normally a simple slotting of the bolt holes when necessary. You can also cut the flanges in between ports to allow for individual tube installation and adjustment.

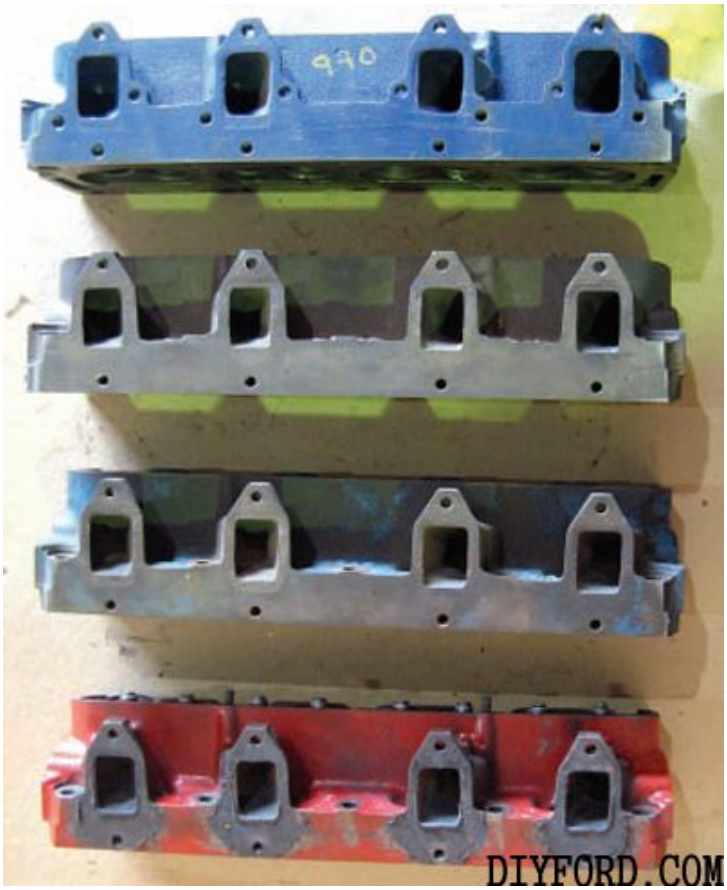
Installing the fasteners in FE headers can range from simply difficult to nearly impossible. Header bolts with a reduced hex size are nearly mandatory—some are available with a 3/8-inch hex instead of the common 7/16-inch hex. Twelvepoint headed fasteners seem like a good idea, but in many cases, it’s difficult to torque them down with an open-end wrench. Be certain that your header bolts are not too long, or they will not easily go into position correctly, may cross thread, or even bottom out in the heads before getting tight. I have an assortment of inexpensive open-end and boxend wrenches that have been cut down and bent to ease this task. You’ll also want a long 1/4-inch drive extension, appropriate swivel sockets, and a box of Band-Aids.

Header Selection

Despite the known fact that header design can have a significant impact on engine performance, you do not really have a lot of choices when selecting FE headers for traditional automotive applications. The most common are from Hooker Headers, which only offers a couple choices for each car, which are comparatively expensive.

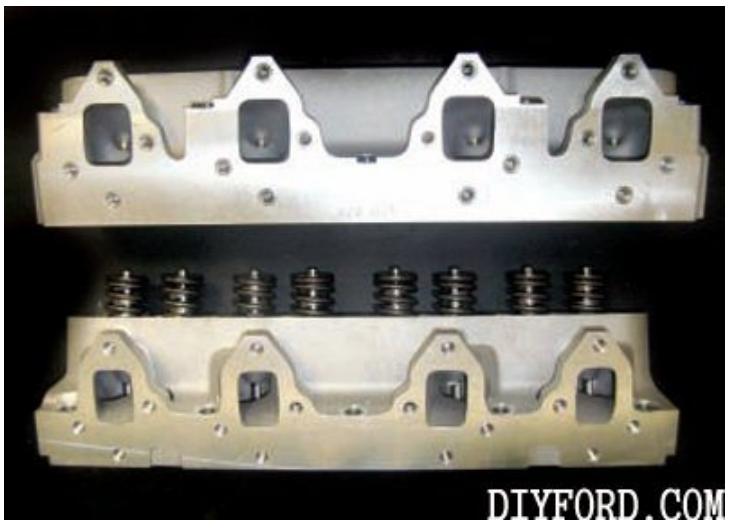


The C6AE-U 390 GT head with the exhaust side shown has a unique 14-bolt pattern. The upper and lower holes are not in the standard FE locations, so this makes the header fit problematic.



From top to bottom, the Cobra Jet, medium-riser, high-riser, and tunnelport heads are shown from the exhaust side.

These Hooker race headers are multi-piece units that wrap around the motor mounts when installed in the car. Be sure your car has enough clearance where you're driving it because these headers are not speedbump friendly.



By comparing the Edelbrock and Blue Thunder heads' exhaust sides, you can see the exhaust port position difference relative to the head's deck surface. The Blue Thunder head exhaust is .400 inch higher, making header fitment more of a challenge, particularly in Mustangs or Fairlanes.

The popular Mustangs and Fairlanes are limited to either a single 1.75-inch primary tube street header or a 2.125-inch tube multi-piece race header. The street headers are offered as unique parts for the Mustang versus the mid-sized cars, but race headers are Mustang-only items that can be "hammer-fit" into a Fairlane chassis. Hooker used to sell a 2.00-inch primary tube race header that was a lot easier to package into the car, but it has since been discontinued.

Hedman also offers a limited selection of FE headers. In fact, there are few options, high costs, and challenging installation.

Ford Powertrain Applications (FPA) offers a variety of short-style headers that are quite a bit easier to install in many FE-powered vehicles. Given the

challenges of installation, and the modest power difference between header styles in streetoriented applications, the short header is an attractive option.

Truck guys have it a lot easier on installation because there's plenty of engine compartment room, and the truck headers even perform better on the dyno. Headers for cars equipped with shock towers (like 1960svintage Mustangs) require the header tubes to make an immediate downward turn at the header-mounting flange, and this adversely affects flow. On truck applications, there is enough room for a straight section coming out of the port before any bends are needed.

When building a package for a +/-500-hp FE, the 1.750-inch primary tube headers seem to be perfectly adequate. With 600 hp or more, you start to see benefits from a larger 2.000-inch pipe diameter. I have seen nearly 800 hp with the 2.000-inch Hooker headers on the dyno. While there is certainly a point where an even bigger tube is needed, the headers need to fit into the chassis. Engines producing 800 hp go into a race package, and in these cases, fabricating custom headers is part of the budget. Therefore, the issue is moot.

On the dyno, I have seen significant changes in torque from header extensions. If you are running with open exhaust, you would be startled to see just how much you can gain— or lose—with a change in collector length. Collector length seems to be more important than primary pipe length by a significant amount, based on my dyno experience.

Cast Manifolds

As mentioned earlier, most factory- cast FE exhaust manifolds are pretty restrictive, but there is a very notable exception. The cast-header style manifolds on 1963–1965 427 Galaxies are startlingly good parts. The designer of these knew what he was doing some 40 years ago. I have tested the cast long-style manifolds on an engine that made 636 hp with Hooker 2.000-inch race headers and only lost 30 hp. If you are building a Galaxie, and can afford the approximately thousand-dollar price-tag, the factory-cast long-tube manifolds are a sure winner. They fit, they're quiet, they don't leak, and they run very, very well.

These recently re-released Doug Thorley race headers criss-cross under the engine. I've never tested them, but they certainly look impressive.

These street headers have slotted mounting holes, which helps ease installation. However, you still need to test fit them for port alignment before mounting them.

Custom Headers

Hand-made custom headers definitely get the most potential power from your engine combination. A header fabricator can optimize pipe sizing, length, and collector designs around any performance parameter. There is a lot of science surrounding header design, but the FE faces real packaging challenges that effectively reduce the potential benefits.

Getting the "right" pipes to fit into the tight confines of a Mustang is a challenge for even a skilled fabricator. Fabricators work on a pay-per-hour basis. You get better performance, but also a significantly lighter wallet.

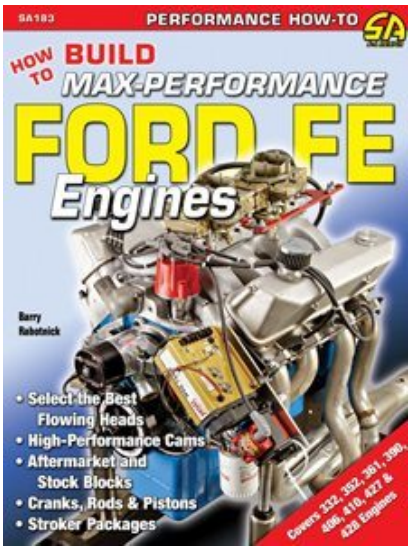
Mufflers

Muffler selection is a very personal decision. Everybody has a different idea of what is "too loud" or "too quiet." In addition, some combinations exhibit drone or resonance at certain speeds, which is something that cannot be predicted. In my dyno- testing experience, I've had pretty good power results from the popular straight-through designs from Magnaflow, but they are loud. I've also done quite well with the much quieter Hooker AeroChamber muffler, which has an unusual internal design.

Gaskets

I have had the best luck using header gaskets from Fel-Pro. These have a perforated steel core, which seems to hold up very well. The inexpensive non-reinforced gaskets do not stay in one piece for very long. Since it's tough to change header gaskets in an FE, you want to use the best possible parts. I have also had good results from using a very thin layer of high-temperature copper RTV silicone on both sides of the gasket— just enough to seal up any irregularities in the gasket surfaces.

Written by Barry Robotnik and Republished with Permission of CarTech Inc



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